JPSS Crosstrack Infrared Sounder (CrIS) On-Orbit Validation

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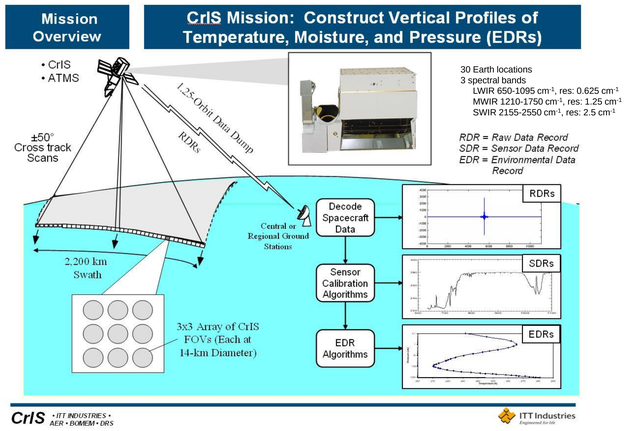
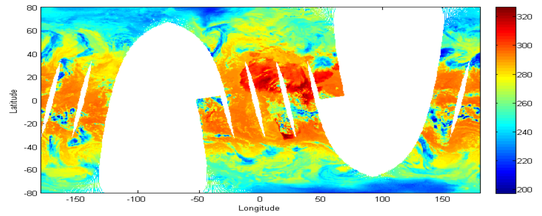
CrIS Sensor Overview

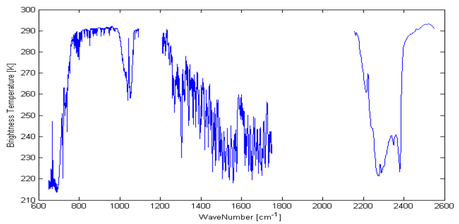


CrIS was launched October 28, 2011 on the Suomi NPP spacecraft into a polar orbit. Other sensors on Suomi NPP are VIIRS, ATMS, OMPS and CERES.

Sample Earth Scene Data

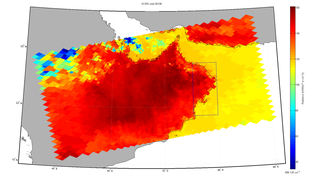


Long wave window band 911.6 to 915.5 cm^{-1} from orbits 01703 – 01706 (February 25, 2012)

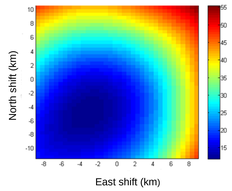


Spectrum from tropical clear sky ocean

Geolocation

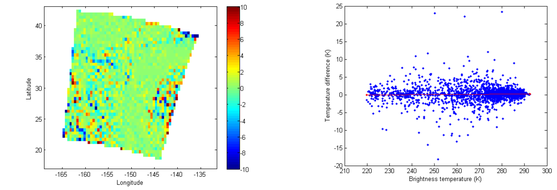


Box shows the section of the image used for geolocation. It is of the country of Oman at the entrance to the Persian Gulf.

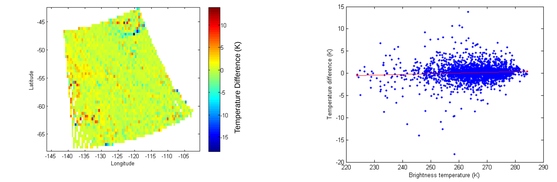


Fit residuals are for a case without the geolocation patch to the software.

Comparison of CrIS Radiances with Other Sensors

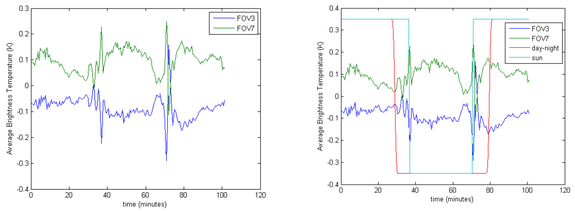


Difference between CrIS and VIIRS M15 band brightness temperatures. Scatter could be reduced by selecting only uniform scenes.

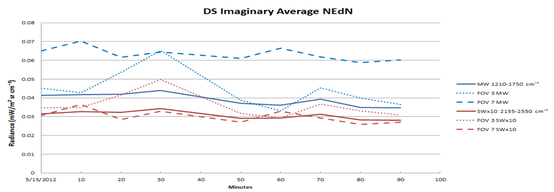


Example of a CrIS - AIRS SNO (Simultaneous Nadir Overpass) that took place over the South Pacific February 25, 2012. These plots are for the average over a LWIR window spectral band from 912 to 915 cm^{-1}.

FOV to FOV Radiance Difference Seen in Cold Earth Scenes

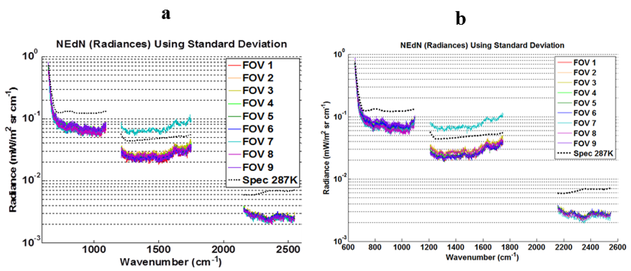


Spikes in FOV3 to FOV7 difference correlate with the sun hitting the Suomi-NPP spacecraft. Brightness temperature data has been averaged over one day. Plot "day-night" is sunlight on the ground. Plot "sun" is sunlight on spacecraft. The average over all FOVs has been subtracted from the FOV data to show differences. This band is at 2256 to 2302 cm^{-1} where the CO_2 absorption is high so the sensor doesn't see through the atmosphere to the ground.

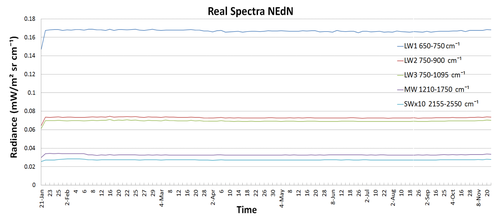


NEdN also shows an orbital depended FOV3 variation with orbital position. (Orbit 02840 May 15, 2012).

NEdN Monitoring

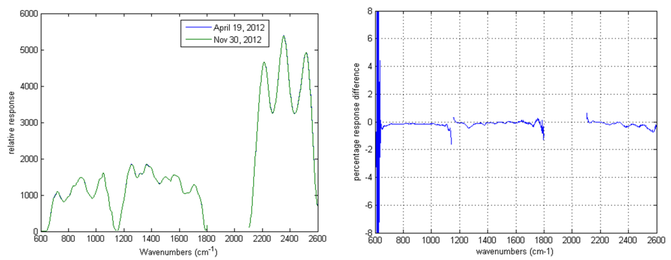


NEdN is the Noise Equivalent Radiance Difference, or total noise level in units of radiance. NEdN was estimated from ICT data acquired on January 23, 2012, Orbit 1241 (a) and on November 25, 2012, Orbit 5592 (b).



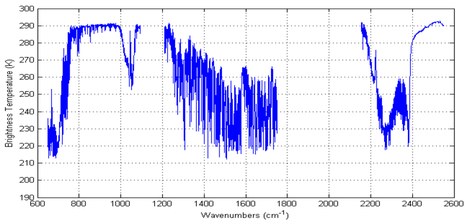
NEdN has been very stable with time. This plot shows the average NEdN trended from January 21, 2012 to November 30, 2012.

CrIS Radiometric Response



The CrIS response has been very stable over time since the latest update to the digital filter coefficients. The response is defined as the difference in counts between the spectra of the Internal Calibration Target (ICT) and the Deep Space (DS) view divided by the change in radiance.

Full Spectral Resolution Spectrum



Full spectral resolution operation is planned for Suomi-NPP starting in the spring of 2013.